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For: GLASS TOUCH SENSING CIRCUIT

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Group Art Unit: 2674

Claim 1 recites a glass touch sensing circuit, comprising a touch sensor, a switch, a compensator, and a touch detector. The touch sensor provides an output signal in response to a user's touch. The switch has a switching period of time differently determined depending on a level of the output signal from said touch sensor. The compensator compensates for a

variation in a level of a reference signal for a variation in temperature, compares a level of an output signal from said switch with that of the compensated reference signal, and outputs a wave-shaped signal in accordance with a compared result. And, the touch detector is responsive to an output signal from said compensator for detecting whether the user touches said touch sensor.

In order to establish a *prima facie* case of obviousness for claim 1, two requirements must be satisfied. First, the cited references must teach or suggest all the features in claim 1. Second, there must have been some teaching or suggestion in existence at the time the claimed invention was made that would have led one of ordinary skill in the art to combine the references in an attempt to form the invention. See MPEP §2143.01 and *In re Rouffet*, 47 USPQ.2d 1459 (Fed. Cir. 1997).

The Caldwell patent discloses a control circuit for a touch pad. The control circuit includes a comparator which compares a signal input from a touch sensor with a reference signal, and then outputs a touch detection signal based on the comparator output. The Caldwell control circuit further includes a potentiometer which allows a user to manually control the level of the reference signal.

Claim 1 is different from the Caldwell patent in at least the following respects.

First, claim 1 recites a compensator which compensates for a variation in a level of a reference signal for a variation in temperature. The Caldwell patent does not teach or suggest these features. More specifically, the Caldwell patent discloses a potentiometer for varying the

level of a reference signal, but neither that potentiometer nor any other element of the Caldwell system varies that level to compensate for variations in temperature.

Second, claim 1 recites that the compensator compares a level of an output signal from the switch with that of the compensated reference signal. The Caldwell system also does not teach or suggest this feature. More specifically, the Caldwell patent does not teach or suggest generating a temperature-compensated reference signal. It therefore logically follows that Caldwell also does not teach or suggest comparing a temperature-compensated reference signal to an output signal of a switch.

Third, claim 1 recites that the compensator outputs a wave-shaped signal in accordance with a compared result. Since the Caldwell system does not perform the comparison of the claimed invention, it follows that Caldwell also does not output a wave-shaped signal based on a result of such a comparison.

Based on at least the foregoing differences, it is respectfully submitted that the Caldwell patent cannot render claim 1 obvious. In order to make up for the deficiencies of the Caldwell patent, the Tsuchiya patent was cited.

The Tsuchiya patent discloses a controller for controlling a thermal printing head of a facsimile machine or printer. The controller includes a temperature detecting circuit which detects a temperature of the thermal printing head, and a temperature compensation circuit which compares the detected temperature to a reference signal and then controls a temperature of the printing head based on a result of the comparison.

Claim 1 is different from the Tsuchiya patent in at least four respects.

First, claim 1 recites a compensator which compares a level of an output signal from a switch with a reference value. Previously in this claim, the switch is recited as switching an output signal from a touch sensor of a glass touch sensing circuit. From these recitations, it is therefore clear that the compensator of the claimed invention compares a signal from a touch sensor of a glass touch sensing circuit with a reference signal. The Tsuchiya patent does not teach or suggest these features.

In rejecting claim 1, the Examiner referenced column 3, lines 40-48, and Figure 4 of the Tsuchiya patent for its disclosure of a temperature-compensation circuit. This temperature-compensation circuit includes a temperature-detection circuit and a comparator circuit. The temperature-detection circuit includes a thermistor 3a which detects a temperature of a thermal printing head 3. The comparator then compares this temperature signal to a reference value and a signal waveform is generated to control operation of the thermal print head based on a result of the comparison. (See columns 3 and 4). The Tsuchiya disclosure therefore makes clear that its temperature-compensation circuit does not perform the comparison function of the compensator recited in claim 1, i.e., the Tsuchiya compensation circuit compares a signal indicative of a temperature of a thermal printing head of a fax machine or printer to a reference value. It does not compare a signal from a touch sensor to a reference value as is the case with the claimed invention. It is therefore clear that the compensator of the claimed invention performs a function which is very different from the compensation circuit of the Tsuchiya patent.

Second, claim 1 recites a compensator which outputs a wave-shaped signal in accordance with a compared result. The Tsuchiya compensation circuit does not perform the comparison function of the compensator of the claimed invention. It therefore logically follows that Tsuchiya does not teach or suggest outputting a wave-shaped signal based on such a comparison. (Incidentally, it is noted that the Tsuchiya compensation circuit does alter a waveform based on a comparison result. However, this comparison result involves a temperature signal for a thermal print head not a touch sensor signal as recited in claim 1.)

Third, claim 1 recites a touch detector which is responsive to an output signal from said compensator. As previously discussed, the output signal of the compensator includes the wave-shaped signal generated based on a comparison between a touch sensor signal and a reference value. Tsuchiya does not teach or suggest generating such output signal based on such a comparison. Instead, the waveform output from Tsuchiya is based on an entirely different comparison, i.e., one between a thermal head temperature signal and a reference value.

Fourth, claim 1 recites that the touch detector detects whether the user touches said touch sensor based on the output signal from the compensator. The Tsuchiya patent discloses a controller which controls the temperature of a thermal printing head. Tsuchiya does not teach or suggest detecting whether a user has touched a touch sensor, nor does it teach doing so based on an output signal of the type generated from the compensator of the claimed invention.

From the foregoing discussion, it is clear that the Tsuchiya patent does not teach or suggest the features of claim 1 missing from the Caldwell patent. It is therefore respectfully submitted that any combination formed between these two patents would fail to include at least

the four features of claim 1 missing from the Tsuchiya taken alone. Because a Caldwell-Tsuchiya combination does not teach or suggest all the features of this claim, it is respectfully submitted that the first requirement for establishing a *prima facie* case of obvious of claim 1 has not be satisfied.

The second requirement for establishing a *prima facie* case of obvious requires a showing that some teaching or suggestion was in existence at the time the claimed invention was made that would have led one of ordinary skill in the art to combine the references in an attempt to form the invention. Applicant respectfully submits that no teaching or suggestion existed at the time the invention of claim 1 was made that would have led one of ordinary skill in the art to combine the Caldwell and Tsuchiya patents in the manner contemplated by the Examiner.

The Caldwell patent discloses a touch sensor for an electrical device such as a lamp. The Caldwell patent does not teach or suggest that its sensor may be modified to include a temperature-compensation circuit such as disclosed in Tsuchiya in order to compensate for temperature variations.

The Tsuchiya patent is also deficient in this respect. Tsuchiya discloses a temperature compensation circuit, but this circuit is used to control the temperature of a thermal printing head of a facsimile or printer. The Tsuchiya does not teach or suggest modifying a touch sensor such as disclosed in Caldwell to include a temperature compensation circuit. Absent such a teaching or suggestion, it is respectfully submitted that it is improper to combine the Caldwell and Tsuchiya patents for purposes of rejecting a claim under 35 U.S.C. §103(a).

Applicant further submits that combining Caldwell and Tsuchiya is impermissible for at least one additional reason. MPEP §2143.02 states that if modifying a primary reference to include features of a secondary reference would render the primary reference inoperable, then that modification is impermissible for purposes of substantiating an obviousness-type rejection. Applying this rule to the present case, Tsuchiya makes clear that its temperature-compensation circuit compares a signal indicative of the temperature of a thermal print head to a reference value. The Caldwell touch sensor does not have a thermal print head. Thus, modifying Caldwell to include the Tsuchiya compensation circuit would result in an inoperable combination, because Caldwell does not generate a signal indicative of the temperature of a thermal print head and thus the compensation circuit of Tsuchiya would be unable to perform its comparison function.

For at least the foregoing reasons, it is respectfully submitted that the second requirement of establishing a *prima facie* case of obvious of claim 1 has not be satisfied.

Because neither requirement for establishing a *prima facie* case of obviousness has been satisfied, it is respectfully submitted that claim 1 and its dependent claims are non-obvious and thus patentable over a Caldwell-Tsuchiya combination.

Claim 10 recites a touch sensing system comprising an input terminal for receiving a signal output from a touch sensor and a controller which processes the signal from the touch sensor based on a variation in temperature to generate a touch detection signal. As noted by the Examiner in the Final Office Action, the Caldwell patent does not teach or suggest a controller which processes a touch sensor signal based on a temperature variation, nor does not use this processed signal to generate a touch detection signal.

In order to make up for these deficiencies, the Tsuchiya patent was cited. The Tsuchiya patent discloses a circuit which processes a signal indicative of a temperature of a thermal print head. The Tsuchiya patent does not teach or suggest that its controller processes a touch sensor signal based on a temperature variation. Moreover, Tsuchiya does not teach or suggest that its compensation circuit may be modified to process a touch sensor signal and Caldwell also fails to provide such a teaching or suggestion. For at least these reasons, it is respectfully submitted that claim 10 and its dependent claims are non-obvious and thus patentable over a Caldwell-Tsuchiya combination.

Claim 11 recites that the controller of claim 10 processes the signal from the touch sensor in a manner which achieves a constant level of touch detection sensitivity in spite of temperature variation. Neither the Caldwell patent nor the Tsuchiya patent teaches or suggest a controller as recited in claim 10, and it is submitted that the additional features of the controller recited in claim 11 are also not taught or suggested by these patents, whether taken alone or in combination.

Claim 12 recites that the controller includes a switch which outputs a switch signal based on the signal from the touch sensor and a compensator which compensates for variations in the switch signal based on temperature variation. Neither the Caldwell patent nor the Tsuchiya patent teaches or suggest a controller as recited in claim 12, and it is submitted that the additional features of the controller recited in claim 11 are also not taught or suggested by these patents, whether taken alone or in combination.



Claim 13 recites that the controller includes a switch which outputs a switch signal based on the signal from the touch sensor and a signal generator which generates a reference signal; and a comparator which compares the switch signal to the reference signal, wherein the controller generates the touch detection signal based on an output of the comparator. Neither the Caldwell patent nor the Tsuchiya patent teaches or suggest a controller as recited in claim 13, and it is submitted that the additional features of the controller recited in claim 11 are also not taught or suggested by these patents, whether taken alone or in combination.

Claim 14 recites that the signal generator includes a level-controller which controls a level of the reference signal based on temperature variation. None of these features are taught or suggested by the Caldwell and Tsuchiya patents, whether taken alone or in combination.

Claim 15 recites that the level-controller varies the level of the reference signal to coincide with changes in the switch signal that result from variation in temperature. None of these features are taught or suggested by the Caldwell and Tsuchiya patents, whether taken alone or in combination.

Claim 16 recites that the level-controller decreases the level of the reference signal to a first non-zero value as temperature increases, and increases the level of the reference signal to a second non-zero value as temperature decreases. None of these features are taught or suggested by the Caldwell and Tsuchiya patents, whether taken alone or in combination.

Claim 17 recites that the level-controller includes a thermistor which output a voltage value that varies the level of the reference value based on temperature variation. None of these

features are taught or suggested by the Caldwell and Tsuchiya patents, whether taken alone or in combination.

Claim 18 recites a touch sensing system comprising a switch which outputs a switch signal based on a touch sensor signal and a controller which compensates for variations in a turning-on period of the switch in order to generate a touch detection signal. The Caldwell patent does not teach or suggest the controller of claim 18 and neither does the Tsuchiya patent. As discussed above, the Tsuchiya patent discloses a temperature-compensation circuit. Unlike the claimed invention, this circuit compensates for a signal used to control a thermal print head based on temperature variations. The Tsuchiya compensation circuit does not control switching of a touch sensor signal, nor does it compensate for variations in a turning-on period of the switch in order to generate a touch detection signal. Absent these features, it is respectfully submitted that a Caldwell-Tsuchiya combination cannot render claim 18 obvious.

Claim 19 recites that the controller compensates for variations in falling edge depth of the switch signal output from the switch. Neither the Caldwell patent nor the Tsuchiya patent teaches or suggest a controller as recited in claim 18, and it is submitted that the additional features of the controller recited in claim 19 are also not taught or suggested by these patents, whether taken alone or in combination.

Claim 20 recites that the controller includes a comparator for comparing the switch signal to a reference signal to generate a compensated switch signal, wherein the controller generates the touch detection signal based on the compensated switch signal. Neither the Caldwell patent nor the Tsuchiya patent teaches or suggest a controller as recited in claim 18, and it is submitted

that the additional features of the controller recited in claim 20 are also not taught or suggested by these patents, whether taken alone or in combination.

Claim 21 recites that the controller includes a compensator which varies the reference signal based on temperature variations. Neither the Caldwell patent nor the Tsuchiya patent teaches or suggest a controller as recited in claim 18, and it is further submitted that the additional features of the controller recited in claim 21 are also not taught or suggested by these patents, whether taken alone or in combination.

Claim 22 recites that the compensator includes a thermistor which outputs a value for varying the reference signal based on temperature variations. None of these features are taught or suggested by the Caldwell and Tsuchiya patents when taken in combination with the features of its base claim.

Claim 23 recites that the controller includes a flip-flop circuit having an input connected to the output of the comparator and an output for supplying the touch detection signal, wherein the compensated switch signal is input into a clock terminal of the flip-flop. None of these features are taught or suggested by the Caldwell and Tsuchiya patents when taken in combination with the features of its base claim.

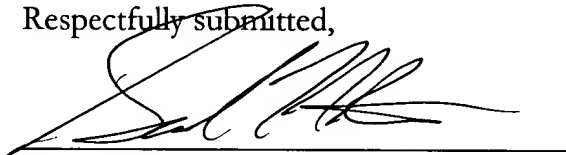
Reconsideration and withdrawal of all the rejections and objections made by the Examiner is hereby respectfully requested.

In view of the foregoing amendments and remarks, it is respectfully submitted that the application is in condition for allowance. Favorable consideration and prompt allowance of the application is respectfully requested.

Should the Examiner believe that further amendments are necessary to place the application in condition for allowance, or if the Examiner believes that a personal interview would be advantageous in order to more expeditiously resolve any remaining issues, the Examiner is invited to contact Applicants' undersigned attorney, Samuel W. Ntiros, at the telephone number listed below.

To the extent necessary, Applicants petition for an extension of time under 37 C.F.R. §1.136. Please charge any shortage in fees due in connection with this application, including extension of time fees, to Deposit Account No. 16-0607 (Attorney Docket No. IK-011) and credit any excess fees to the same Deposit Account.

Respectfully submitted,



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